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## Bee Culture in Cottage Hives.

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Having given a sketch of the natural history of the honey bee, we shall, before taking up the general subject of culture, proceed to notice the diseases of that insect—this seeming to be the more suitable place for introducing the topic.

Strictly speaking, the bee is subject to only two diseases—dysentery and foulbrood. The former is of frequent occurrence in almost every apiary, usually prevailing at the close of winter. The latter originates only during the brooding season, and appears commonly to be confined to certain localities or districts.

### DYSENTERY.

This disease, from its frequency, has probably come under the observation of almost every experienced bee-keeper. It consists in the inability of the workers to retain the feces with which their intestines are filled. Hence their evacuations are made involuntarily, on the interior sides, the bottom, and the front of the hives, and on the combs themselves when the case is aggravated, and the weather does not permit the bees to come forth. The discharges consist of brownish or buff colored fecal matter, of an offensive odor, and causing stains difficult to remove from white cotton or linen fabrics. This disease never occurs in populous colonies well supplied with honey and pollen, unless the bees are kept in very prolonged confinement by stress of weather, and then ceases as soon as they are able to fly out. It is sometimes, also, induced by external causes, such as the frequent disturbance of a colony during winter, by cats, mice, birds, or careless persons. This leads to an increased consumption of honey, thus surcharging the intestines with fecal matter, causing functional derangement, followed by premature involuntary evacuations. Occasionally it occurs from the consumption of unwholesome honey—such, for instance, as that procured from fir or pine trees, or from some kinds of honeydew. Baron Ehrenfels relates the case of an entire apiary of more than three hundred stocks, which suffered greatly from dysentery caused by the consumption of honey gathered, late in

autumn, from the fir trees of a neighboring forest. Such honey usually remains unsealed in the cells and, attracting moisture, partially ferments and turns sour. Dysentery is sure to follow the use of it, if the bees have not early and frequent opportunities to fly out and discharge their feces. No such ill consequences follow the use of such honey in spring or summer.

Dysentery sometimes prevails as an epidemic among the bees of a whole neighborhood, apparently assuming a contagious type. This was the case in Silesia in 1840, when it rapidly spread through the country, and destroyed two-thirds of the hives in that province. Dr. Jæhne, however, who investigated the case, attributed the disease to the use of honey collected from the common heath (*Erica vulgaris*), which from the scarcity of other pasturage the previous season, constituted the almost exclusive food of the bees that winter.

External cold, and a low internal temperature in the hive, together with irregular clustering on the combs in winter, may superinduce dysentery, from the increased consumption of honey and pollen thereby caused, and the resulting accumulation of fecal matter, while the bees are confined to the hive. This is the reason, too, why weak or young stocks are more liable to be attacked by this disease than strong or old ones. The former are rarely able to maintain the requisite temperature in the hive, in virtue of their numbers; and the combs of the latter, in which successive broods have been hatched, are much warmer and better adapted for wintering bees, than new combs in which only one brood, or perhaps none, have been reared.

Great dampness in hives will cause dysentery, if not early removed. This often occurs in hives constructed of thin boards, on which during "cold spells," perspiration and exhalations become condensed on the interior sides and top, and even ice is occasionally formed. When the weather moderates, the bees partially uncluster and lick up the condensation, and if it be in excess, as it frequently is, it overloads their stomachs and causes disease. The case is still worse when the condensation is so great as to drip

down on the clustered bees from the top, as sometimes happens in narrow standard hives during very cold weather.

Feeding stocks late in the fall with greatly diluted honey or very limpid substitutes for honey—such as malt or potato syrup, pear or carrot juice, boiled and somewhat inspissated, and other similar liquid sweets, is hazardous, and frequently causes dysentery. Such food is not usually immediately consumed, but stored up in the cells for future use, and, remaining unsealed, becomes acid and unwholesome.

Dysentery commonly attacks only a few individual bees at first; then spreads and victimizes a greater number—thus rapidly extending till nearly the whole population suffers from its ravages. If the cold is not so severe as to prevent the bees from leaving the cluster when first attacked, they will come out and discharge their feces on the lighting board. But even then many will be lost and the population rapidly diminish. On turning up the hive a highly unpleasant smell issues, and many dead bees are seen on the bottom board, on the sides, and between the combs. The interior of the hive, especially the bottom board directly below the cluster, is befouled, and even the cluster itself has not escaped defilement where the disease is aggravated and has long afflicted the colony.

The disease is more apt to make its appearance and become destructive in ill-constructed box hives, especially in such as are made of thin boards, than in straw hives, as the latter readily absorb moisture, and perspiration is not so apt to become condensed in them.

If care be taken to guard against whatever conduces to the production of the disease it will rarely occur, except in weak colonies confined for protracted periods by stress of weather; and nothing can save such colonies, when remaining on their summer stands, except a timely change of weather. The prescriptions and remedies so frequently recommended in bee books—such as sprinkling the bees with a mixture of spiced wine and honey, are not only useless, but positively injurious, like the mass of quack medicines, because the disease is not, as in human subjects, attended by an affection of the mucous membrane of the bowels, and requires no after treatment when relief comes from a change of weather, permitting the bees to deposit in the open air. But as such weakened and reduced colonies are apt to neglect the opportunity to come forth when it does occur, it is well to rouse them from their stupor by tapping their hives if they remain quiet on a fine day when the bees of other hives are briskly flying.

#### FOULBROOD.

Of this dangerous and fatal disease few beekeepers fortunately have any knowledge, from their own experience. It seems to be confined to certain localities, rarely spreading beyond them, and seldom establishing itself permanently in such new quarters, unless local causes favor it. The origin and true nature of this disease are still involved in mystery; but as it has of late attracted the attention of medical men, we may possibly be furnished with effi-

cient means for its prevention or cure, though its source remain undiscovered. In a hive afflicted with this disease, the brood perishes in the cells, generally when already sealed over, soon putrefies and fills the interior with a noisome stench. In some instances only a few scattered cells are affected, and the dead brood is at once removed by the workers. But when the disease assumes a more virulent type, the numbers perished or perishing is too great to admit of removal, and entire sheets of comb exhibit one vast mass of putrefying matter. When this is the case, the only judicious course is to set the hive over a brimstone pit, stupefying the inmates, and then burning up the whole. Some have advised driving out the bees previously and securing the queen, that she might be used in supplying a queenless stock, or in forming an artificial colony. This advice was given under the impression that the queen would not communicate the disease to the stock in which she might be introduced. It is now known, however, that the infection can be thus communicated, and it is hence safest not to preserve her for subsequent use. Where bees are kept in common hives, in which the combs are a "fixture," it is utterly useless to attempt the preservation or cure of a colony suffering from foulbrood; and even its temporary retention for the purpose of investigating the disease and acquiring an insight into its nature, is highly injudicious. It is infinitely more likely that by such retention the disease will be spread to other stocks in the apiary, or in the neighborhood, than that any valuable discovery will be made. With movable comb hives the case would be very different if we knew of some efficient cure, which could be quickly applied.

Several years ago Dr. Asmuss, of Berlin, Prussia, announced that he had discovered the living larvæ of a parasitic insect—the *Phora intricassata*—in the dead larvæ of a hive suffering from foulbrood, and he attributes the disease to the ravages of this parasite. This may be one cause of the disease, if Dr. Asmuss's observation is correct, but even then it remains to be ascertained whether it is the sole cause.

German bee-keepers distinguish between humid and dry foulbrood, and also between contagious and non-contagious. This is perhaps a distinction between the different stages of the disease, rather than between different types.

When the disease is discovered early, or before it has made much progress, it may be arrested and subdued by removing the queen immediately, and keeping the colony queenless till some time after all the eggs it contained are hatched and the brood matured. Meantime the colony should be regularly fed with pure honey. A recent writer strongly recommends the addition of a large proportion of the white of eggs to the honey fed to such stock, and alleges that this mixture is itself a certain cure. We are not aware that it has yet been tried by others; though we have ourselves used it for other purposes with good results.

Bees are likewise liable to be infested by a species of intestinal fungus, which has been called *Mucor mellitophorus* or *Oidium Leuckarti*.

This can scarcely be called a disease, as the workers do not appear to suffer from it, being as lively and industrious as others. But there is reason to suspect that it does injuriously affect queens, because those in which it was detected had been notoriously poor and irregular layers.

Sealed brood is sometimes found dead in the cells, with the brood turned towards the septum of the comb. Whether this is the result of disease or not, is not yet ascertained. Some think it is caused by the larvæ of the wax-moth; others attribute it to some noxious effluvia in the hive; and others again believe it results from a general debility of the colony. It is of rare occurrence, and on the whole does little damage.

**ALSIKE CLOVER.**—Hon. Isaac Newton, Commissioner of Agriculture, recently received a communication from Pennsylvania relative to the quality of the Alsike clover, which has recently been introduced into this country from Europe. The writer states that he planted the seed in April, 1865, and that during the autumn it did not appear as promising as the common clover. This spring it grew luxuriantly, and about two weeks ago the cattle on the farm were admitted into the field, and also into an adjoining field planted with red clover. They showed a decided partiality for the Alsike clover, and consumed the greater portion of it, while the other clover remained untouched.

Commissioner Newton has tested this variety of clover at the "Experimental farm," in this city, and is fully convinced of its superiority over any other variety known in the United States. It is a hybrid between the red and white clovers, and possesses the luxuriance of the red combined with the fineness of the white, and will probably be largely cultivated when its merits become known throughout the country.

**TREATMENT OF STINGS.**—M. De Mortillet has published in the *Sud-ost*, a Grenoble paper, a curious remedy for the sting of dangerous insects. It is the application of the wax of the ear to the injured part. This simple remedy, he positively asserts, will cure the deadly sting of a poisonous fly, which would otherwise produce carbuncle. Whatever may be the efficacy of this treatment, there can be no harm in trying it, the substance being always at hand. Should it not succeed, the patient will always be in time to have recourse to a more radical treatment. This of course implies that every-body has dirty ears.

When bee-masters get hold of queen bees, they are able, by controlling the movements of these natural leaders of hives, to control the movements of the hives themselves; and not unfrequently, in Churches and States do there exist inconspicuous bee-masters, who, influencing or controlling the leader bees, in reality influence and control the movements of the entire body, politic or ecclesiastical, over which these natural monarchs preside.—*Hugh Miller.*

### A Bee Story.

My friend, Silas Narrow, was no man of willow. The oak of Bashan was hardly more stubborn and tough. His will was strong, and went in a straight line. What he knew, he was sure of, and what he thought he knew he was just as positive in believing. He has all his life been a regular attendant on divine worship; but having "notions of his own," he has never found a church with which he could unite, a creed that he could adopt, or a minister in whom he could confide. He was not exactly a crotchety man, but he was self-willed, wise, strong, and decided. As for sin, he had no doubt there is a great amount in the world, and not a little among his neighbors. But he could never believe that sin deserves what the Bible and what ministers say it does.

"Why," said he, "all the preaching in the world won't make me believe that a single sin is such a terrible thing that it must ruin a world. No doubt it was wrong in Eve to pluck and eat the fruit; but it might have been done thoughtlessly. But who can believe that so great results came from a cause so small? that such a wound came from so small a quantity of poison?"

Old Mr. Truman, his neighbor, was a man of few words, but his meek spirit rested on pillars of truth, and was refreshed by one of the many streams that flow out of the river of God. With him Mr. Narrow had many a conversation, but with no abiding results. Arguments would not affect him; facts did not stand in his way; he moved right on to his own conclusions.

One day Mr. Truman saw his neighbor coming, and knew by the screw of his face that he wanted to have a large theological battle. He had had so many on the subject with him that Mr. Truman shunned the encounter. He was very busy in his bee-yard. Mr. Narrow came and leaned over the fence.

"A fine lot of hives, neighbor Truman; don't they sting you?"

"Sometimes; but if I am careful and gentle they seldom quarrel with me. You know what a sting means, I presume?"

"No; I don't remember that I was ever stung in my life. I have heard some people make a great ado about it; but I don't believe so small an affair can hurt so terribly. It's not much worse than a small bite of a horse-fly, I take it."

Just at that moment a cross bee came buzzing round the head of Mr. Narrow, and in the wink of an eye, just picked the lower tip of his left ear. It seemed a mere touch, and he was off in a twinkling.

"There, now I'm stung, true as the world?"

"How does it feel?"

"Why, at first a sharp little prick, but now it seems to grow a kind o' warm."

Mr. Truman hastened to him. He well knew what it meant.

"Come this way and sit down, friend Narrow, and let me put some saleratus on the wound."

"O, it's nothing; it will be all over in a minute."



Mr. Truman knew better, and he hastened into the house to get the saleratus, and to call his wife for help. When he came out, he found poor Narrow sitting down on the grass, holding his head and rocking his body. It was too late for the saleratus. His eyes became red and rolling, his face was flushed and burning, and it seemed to Narrow that it was growing large, large, and was already as big as a bushel basket. Then it seemed to be covered with a sheet of fire. Soon after, the world began to whirl around, and the ground to rise up and strike his head. The fact was he had fallen over on his back. He now became deadly pale—white as a sheet—with cold moisture covering his face, and every part of him was in a tremor. Then he began to faint, and the world grew dark, and he groaned, and felt that he was dying. He grew faint and fainter, till he was all gone. After a while, as he began to revive a little, the stomach took its turn, and the poor fellow vomited as if he would retch himself to death. There was no peace till the stomach was completely empty. Gradually, however, he began to come to; and after two hours was able to walk to his home. He went away silent, as if still suffering; and, in fact, it took him a week to recover fully from the affair.

The next time he met Mr. Truman, he seemed cold towards him, as if he had set the bee on him, or as if he had done him some wrong. The fact was, he had met with a theological argument which he knew not how to answer—and it troubled him. On the other hand, Mr. Truman well knew that he could now corner his friend.

"Well, friend Narrow, have you fully recovered from the bee-sting?"

"Yes, pretty much. But who would have thought?"

"Thought what?"

"How much does a bee weigh?"

"Why, it takes between three and four hundred of them to weigh an ounce."

"And how much of the poison did the critter leave in my ear, I want to know?"

"A quantity so small that you probably could not have seen it with the naked eye."

"Now aint it strange that so little poison could go through my whole body, and in five minutes make me so sick? Why, I was never so sick in all my life!"

"Very powerful, to be sure. But tell me, now, don't you think that the bee is a powerful preacher, and very sound in argument?"

"What do you mean?"

"Just this: you know now—and if you don't, just step over into my bee-yard and have it repeated—you know that in an instant of time the sting may go into your body, and in an instant you may, from the smallest particle of poison, be so sick that you can't stand—nay, you are at the very door of death. This is just what the Bible teaches about sin. It does not take much time to commit it. It may seem a very small affair; but it is a deadly poison, or, as the Bible says, 'the exceeding sinfulness of sin.' If so small a speck of the bee-sting can throw you, a strong man, flat on the ground,

and take almost your life away, don't you see that one sin could ruin our first parents? Your ear seemed to stand for the whole body, and touching that, poisoned the whole. It made 'the whole head sick, and the whole heart faint,' did it not?"

"Well, well, I won't dispute; but this I will say—that if anybody hereafter tells me that a little poison can't produce great sufferings, just let one of your bees sting him, that's all."

The *Western Christian Advocate* says of the above article: "It has some statements that seem improbable, but a friend well versed in bee culture informs us that it takes about 400 bees of ordinary size to make an ounce, or 6,400 for a pound avoirdupois. A bee-sting on a vein of the neck has in several instances resulted fatally. Horses have died from the effects of half a dozen stings on the veins of the nose. The article in question has an argument in theology worth heeding."

**BAGSTER'S PROCESS OF MELTING HONEY COMBS.**—The combs are placed in a conical earthen vessel filled with a mixture of one ounce of nitric acid to a quart of water. This is set over an open fire and stirred till the combs are completely melted, when it is removed from the fire, and allowed to cool gradually. The product is divided into three layers, the upper one pure wax, the lowest chiefly impurities, and the middle containing sufficient wax to be added to the next melting. A marketable wax is thus obtained at a single operation without straining or pressing.

**BLEACHING BEESWAX.**—Add to one pound of melted wax two ounces of pulverized nitrate of soda, and then stir in by degrees a mixture of one ounce sulphuric acid and nine ounces of water. When all the acid is added, it is allowed to become partially cool, and the vessel is then filled up with boiling water and allowed to cool off slowly. The wax, when cold, is put into boiling water to remove the sulphate of soda and the acid. It is then quite white, and should be perfectly freed from nitric acid, which tends to render it yellow.

There is still so much mystery attached to the habits of the bee, and especially to the internal economy of the hive, that the scientific study of these insects affords ample scope for much patient and hopeful research. But if the whole history of the hive bee had been opened to us, so as to preclude the hope of future discovery, there is quite enough in the simple verification of the discoveries of others to interest and astonish every lover of nature.

The farmer who is content with an occasional stroll over his fields, and a similar inspection of his yards and granaries, will in vain expect to thrive. A careless and ignorant bee-keeper, who does not know and does not do the right things at the right time, can just as little hope for success in his pursuit.

### Enemies of Bees.

There are amongst the animal tribe, few creatures who have a greater number of formidable enemies than the bees. Notwithstanding their sting, so dreaded by the greatest of all their enemies, man, and which in many instances is so effectual for their defence, there are amongst the feathered tribe many, which swallow the bees whole, or they appear to make it a matter of amusement to kill them and then to pick the bodies to pieces, without apparently appropriating any part of them to the purpose of food. Amongst the insects there are many, which are their superiors in strength, who attack and kill them for the purpose of devouring them. There is scarcely any season in which the bees are secure from the attacks of their enemies. In summer, they are kept in a continual state of alarm and agitation by the wasps, moths, ants, and earwigs; and in winter, they are subject to the destructive visitations of the mouse, who prefers the warmth of a hive, and good cheer before him, to his cold domicile in the ground, and to a precarious subsistence obtained by personal exertion and robbery. The depredations of the common and the field mouse may be always prevented by the provident bee-master, by so contracting the entrance of his hive at the commencement of the winter, that only a single bee can come out at a time. We have, however, experienced, that this precaution does not always succeed; for the cunning animals, finding their ingress into the hive prevented, where they expected to find it, have proceeded to gnaw away a portion of the lower band of the hive, and thereby steal into the hive, as they suppose unperceived; but the vigilant bee-master, on taking the periodical survey of his apiary, will soon discover the secret inroad of the animal, if he observe on the ground a number of nibbled straws, which will be an indication to him that some evil has been committed to his hive, and the cause of it will soon present itself. As, however, in all cases, a preventive is better than a remedy, so it is with the inroads and attacks of the enemies of the bees; for in the majority of cases, it is within the power of the bee-master to adopt those measures, by which he may bid defiance to all the enemies of the bees, with the exception of those who obtain admittance into the hive by their wings. It is the careless and injudicious manner in which the hives are generally placed, that exposes them to the attack of their enemies; and in some instances, it has come under our observation, that the proprietors of hives, so far from adopting any precautionary measures, have, literally, liberally supplied the enemies of their bees with the means of making their attacks. Sometimes, the hives are placed so close to a hedge or paling, that the ants, the earwigs, and the spiders have, as it were, a ladder provided for them, by which they can ascend into the hive; at another time, the hives are placed so near to the ground, if not on the ground itself, that the slugs, the snails, the lizards, and other vermin can obtain easy access to the hive, and carry on their depredations unknown to the careless proprietor.

A snail is a vile enemy of the bee, not so much for the quantity of provisions which it consumes, as for the injury which it commits to the combs. The creature, except in winter, is seldom at rest, and invigorated by the warmth of the hive, it crawls over the combs, leaving behind it its track of slime, which is so hateful to the bees, that rather than endure it, they will leave the hive altogether.

The single pedestal is one of the best preventives against the attacks of almost every enemy; to ensure success, however, the bottom of it must be covered over with some unguent, such as pitch or tar; or a piece of sheep's skin with the wool on, will be found, of all preventives, the most efficacious.

It is in the winter that the attack of the mouse is most to be dreaded, and therefore every means should be taken for its destruction. It is however the field mouse, more than the common house mouse, which takes up its winter quarters in a hive, and, therefore, we generally keep some traps of the following construction in the immediate vicinity of the apiary. Let a pea be soaked in water, then draw a thread through it, and tying the two ends to two small sticks, place them in the ground the exact width of a brick; the brick is then, like an inclined plane, placed gently upon the thread, when the mouse coming to eat the pea, gnaws away the thread, on which the brick falls, and kills him. By means of this simple trap, we have killed three and sometimes four mice in one night.

All spider webs should be carefully removed from the vicinity of the apiary; and in this respect, the bee-master cannot be too vigilant in the month of August and September, when the spiders abound, and construct their webs in every quarter. It is believed by some persons that the size and weight of the bee will carry him through the web, but in this opinion they will find themselves deceived. It may happen in isolated cases; but we have too often witnessed the corpse of a bee in the web of a spider, to doubt for a moment the great evil which the spider commits in the vicinity of an apiary. We, in general, do not satisfy ourselves with brushing away the web, but we also brush away the cause of it, by effecting the death of the spider; for the removal of the web is but a temporary remedy, as perhaps before six hours are elapsed, another one will be found at no great distance from the former one.

It is not, however, the common garden spider which insinuates itself into the hives, but that particular species which spins its web in the corners of our rooms. Towards the close of autumn, they steal into the hives, deposit their eggs between the bands of straw; and thus, at the commencement of the season, the eggs are hatched by the increased temperature of the hive, and the bees become subject to a perpetual and irremediable annoyance. It is on this and similar circumstances that our objection to the common cottage hive, and indeed to all those the make of which prohibits the examination of the upper part of the combs, is founded. The proprietor, from the make of the hive, has no means of knowing that the spider or any other vermin

have made their lodgment in the hive, and therefore, with the ignorance of the existing evil, the gradual decline and ultimate loss of the hive become a problem, which he cannot solve; and after divining a number of causes, the real one is the very last that he will be disposed to fix upon or acknowledge. As long as the common straw hive continues to be in general use, it is in vain to prescribe the necessary remedies for many of the evils which attend the management of bees, as they cannot possibly be reduced to practice on account of the insuperable obstacles with which the peculiar construction of the hive is attended.

The wasp may be considered as one of the most redoubtable of all the enemies of the bees. According to several writers, and especially Reaumur, it is asserted, that the wasps not only devour the honey, but the bees themselves. From our own experience, however, we cannot verify that statement; on the contrary, we never witnessed a wasp attempt to enter a hive, and the bees attacked him, that he did not exhibit the arrant coward, and hasten to save his life by a precipitate retreat. Reaumur says, "I have often seen the hornets, and even the common wasps, that are not larger than the bees, hover about a hive, and run about on the pedestal for the purpose of espying the favorable moment to pounce upon a laborious bee, returning from the fields, fatigued and laden with pollen, and who makes the most useless efforts to defend itself, for in a moment it is killed. Sometimes the wasp flies away with its prey, but at others it consumes it on the spot. I have frequently seen the bees occupied on the flowers, gathering their honey or farina, which have been seized upon by the wasps and carried away."

The destruction of a wasps' nest is a task of no little difficulty, and, therefore, we prefer in the months of February and March to keep a strict look-out for the mother or queen wasps, who about that time are aroused from their hibernating state, and sally forth to found their colony in ruined walls or banks. The destruction of one queen wasp is tantamount to the destruction of hundreds, and, we may add, of thousands of wasps; and as in that early part of the season there is not a common wasp in existence, the bee-master ought to congratulate himself upon the death of every *large* wasp that he can accomplish, for he may be certain that it is a mother wasp. In some parts of Scotland, the wasps are so numerous, that the existence of every hive is endangered; and as few of the cottagers are aware of the injury which the wasps commit upon their hives, they are suffered to carry on their depredations with impunity, until the hives are wholly destroyed. In Perthshire, we killed one morning twenty-nine mother wasps; calculating, therefore, that a wasps' nest contains, on an average, six hundred wasps, we that morning prevented the birth of 23,400 robbers, to be let loose upon the world, to live upon the labors of the industrious bee. If the bee-master cannot spare the time, nor is possessed of patience sufficient to continue the chase after a mother wasp, let him offer a premium to the cottage boys for every mother wasp

that they will bring him. We offered a penny to the urchins living in the immediate vicinity of our apiary for every wasp that they would bring us, and not an evening elapsed without a call being made upon us for from fifteen to twenty murdered mother wasps.

Some persons are apt to suppose that the stopping up of a wasps' nest is equal to its destruction. There is, however, no truth in the supposition, for it is wonderful in what manner these insects will work their way through a barrier, supposed to be impenetrable. We have frequently plastered up the aperture of a wasps' nest at the close of the evening, by which we supposed that we had accomplished the death of the inmates of it by gradual starvation; but on visiting the nest on the following morning, we have found, to our surprise, that the wasps had obtained an outlet, and were joyfully amusing themselves, as if in ridicule of our puny efforts. The only certain method of destroying a wasps' nest, is by sulphur; but the difficulty of arriving at it is sometimes great, on account of the depth at which it is built in the ground, which baffles the patience of the most inveterate wasp hater, a character which generally belongs to all keepers of bees.

The provident plan of plastering the hive to the bench or pedestal on which it is placed, is an excellent guarantee against the depredations of the wasp; for they, who have paid a strict attention to the motions of that insect, must have frequently perceived, that when the wasp has been repulsed from the entrance of the hive, by the boldness and vigilance of the bees, he takes a survey of all the other parts of the hive, particularly the back part, and so keen is his eyesight, that he will immediately discern the slightest crevice, through which he can obtrude his body into the hive, and if one has discovered it, there will soon be a hundred to follow his example.

We are far from recommending the practice adhered to by many keepers of bees, of hanging bottles filled with some saccharine liquid in the immediate vicinity of the hives; for although a few wasps may be destroyed by it, yet they act rather as objects of invitation to the robbers, and undoubtedly entice a greater number into the neighborhood of the apiary than would perhaps otherwise have approached it. Independently of this disadvantage, the bees themselves are most greedily disposed to partake of any saccharine fluid within their reach; and hostile as the wasp and the bee may be towards each other, when the former invades the territory of the latter, yet we have often seen them partaking in social fellowship of any sweets which chance may have thrown in their way. A bee will visit a bottle of sugar and water as greedily as a wasp, and that which will drown a wasp will drown a bee; it therefore scarcely amounts to a question whether the life of one bee be not dearly purchased by that of a dozen wasps.

The ant claims no secondary rank in the number of the enemies of the bees; but in regard to the bees themselves, no fear whatever need be entertained for their safety. The ants are very capable of gratifying their appetite for the



mellifluous stores of the hive, but they appear to know to what they would expose themselves were they to proceed to the pillage of a well-peopled hive. We have often admired the choice which certain ants have made of the place in which they have established themselves, in comparison to that which they might have chosen, and which combined within itself greater advantages than any other that might have been offered to them. On opening the shutters of my glassed hives, I have often found hundreds of ants, which had established themselves between the shutters and the panes of glass; and they had even transported thither their eggs, their larvæ, and their nymphs, the number of which equalled, and sometimes surpassed that of the ants themselves. Where in the whole garden could they have found a place in which they could enjoy so high and regular a degree of heat? But at the same time, not an ant was to be seen inside of those hives, which had so many of them on the outside, although they could have found a number of crevices by which they could have entered; and which, no doubt, they possessed every disposition to do, if the honey had not been so vigorously protected. When, however, we have left any hives for a few hours in the garden, the bees of which have died, the ants then, who have nothing to fear, hesitated not instantly to regale themselves with the honey, which had remained in it; but we never witnessed that they offered any annoyance to those bees which belonged to a well-peopled hive.

The toad is a ravenous enemy of the bee, but it seldom happens that the ugly animal can carry on his ravages without immediate detection; yet, there are particular occasions, when his visits to the hives cannot be ascertained, as they are generally paid during the night. In hot sultry weather, when the bees lie out during the night in clusters for the benefit of the air, the toad will frequently place itself under the cluster; and as it frequently happens that a few will fall to the ground, the toad makes a dainty meal of them before they can regain their companions. We once killed a toad under one of our hives, and found nineteen undigested bees in its stomach. This appetite of the toad for bees is confirmed by Lapoutre, who, in his *Traité sur les Abeilles*, mentions that he once found twenty bees in the stomach of a toad. The wasp, as well as the bee, is a *bonne bouche* for the toad; but if he would let the latter alone, we would not quarrel with him as to the number which he might devour of the former, and under those circumstances, he should have our zealous co-operation in the augmentation of his species; but, as he exhibits such a decided partiality for the bee, a spade or a rake generally puts an end to his existence, and we advise all keepers of bees to follow our example.

Birds are great enemies to bees, especially the woodpecker, tom-tit, the swallow, and almost all the gallinaceous tribe. In regard to the latter, however, it appears to be more a matter of sport with them, than any fixed habit or epicurean relish they entertain for the body of the bee; the few, however, that they destroy, cannot have any sensible effect upon a populous

hive, but still we do not like to see them about our hives, except towards the close of the day, when they catch the moths, which with the setting of the sun are generally seen hovering about the apiary. In regard to the tom-tit, the French apiarians consider it as rather a formidable enemy; for Buffon says, that it employs the following stratagem to satisfy its appetite for the bees. The artful biped, knowing the extreme vigilance of the bees, and that they are on the alert at the slightest sound, alight on the hive, and begin scratching with their claws, and tapping with their beaks; on which, the sentinels come out of the hive to ascertain the cause of the annoyance, when one is caught up after the other, until the little cormorant has satisfied its appetite. The love of the tom-tit for the bees is in a great degree confirmed by Lapoutre, who says, that he saw under a tree, in which there was a tom-tit's nest, a surprising quantity of the scaly parts of bees, which these birds had dropped from their nests. A little shot and powder is the surest remedy for these malpractices of the tom-tit family, and we never hesitate to apply them, whenever an opportunity presents itself.

But of all the enemies of the bees, the wax moth is the most formidable. In those places where the moth abounds the hives should be frequently visited, and especially the weak ones, in order to ascertain if the moth has begun its ravages. The destruction of a few larvæ at the period of their maturity will prevent the multiplication of some thousands of these insects, which carry with them destruction and desolation through a whole apiary. It is easy to ascertain if the moth has made its lodgment in the hive, by the dejection and lassitude of the bees, and by a cessation from their wonted labors. It is in the tops or coverings of the hives, that these dangerous insects frequently establish themselves, especially if they be made of straw, between the bands of which they deposit their eggs, or spin their cocoons. This examination should be made early in the morning, for the wax moths retire to their recesses when the light appears, and as they do not take to the wing, but run about the exterior of the hive, they are easily destroyed.

In regard to the visitation of the interior, the cottage hive presents itself with all its insuperable obstructions, and therefore we can only describe a few signs by which the existence of the moth in the hive may be ascertained. The hive must be gently lifted up and the platform carefully examined. If some shreds or fragments of wax be seen, or some yellowish or red grains, which are merely some portions of the pollen, which the larvæ have extracted from the cells, or if some black grains be seen which are the excrement of the moth, then the conclusion may be drawn that the moth is carrying on its ravages.

Previously, however, to our entering into any further detail of the means by which the wax moth may be destroyed, it may be advisable to impart that information by which this enemy of the bee may be recognized, and, we may add, the most dangerous enemy which this climate generates; for such are the ravages which

they commit in some seasons, that their complete destruction would be one of the most inestimable benefits which could be bestowed upon every one who makes the culture of the bee his principal study.

Entomology designates two species of wax moths, the *galleria cereana*, and the *galleria alvearia*. The former is the species now under our consideration, and is known by the name of the wax moth, and in France by that of *fausses teignes*, or false moths. It takes its name of *galleria*, according to Fabricius, because its larva or worm moves only in a gallery or tube, composed of threads covered with its excrement and with wax. This moth is of the genus *phalaena*, and is seen on the wing only at twilight. Its color is of a darkish grey, with small spots or blackish streaks on the interior edge of its upper wings; it is about six lines in length. When the female is about to lay her eggs, she steals into the hive at night, and deposits them on the interior sides of the hive, or even sometimes on the side combs; it then leaves the hive, and it is supposed that it dies soon afterwards. From every egg bursts forth a worm, which in its turn becomes a moth. It appears at first in the form of a larva, and it is in this state that it commits such terrible ravages. This larva is of a palish white; the head brown, having sixteen feet, by which it regulates its motions. It spins the silken thread, with which it constructs its galleries. These galleries or tubes are at the first composed of but a few threads; but in proportion as the insects advance in growth, they consolidate them by augmenting the number of the threads, and adding to them a part of their excrements, and some particles of wax.

Their galleries increase insensibly in diameter, and become eventually sufficiently solid to protect their soft body, which has no particular defence from the stings of the bees. It is by these means that they penetrate with impunity into the very midst of their armed enemies, against whom they are not provided with any means of defence, having no offensive weapon; and the body, with the exception of the head, which is enclosed in a kind of cuirass, being incapable of resisting the slightest attack.

When the time is arrived appointed by nature for their metamorphoses, the larva retires between the platform and the interior edge of the hive, if it be made of wood, or between the sides, or in a comb that has been abandoned by the bees. They spin a web or cocoon in which they envelop themselves, and in which they undergo the metamorphosis into moths or *phalaenæ*. They then leave the hive to propagate their species, and the female being fecundated by the male, steals in her turn into the hive, deposits her eggs, and thus lays the foundation for those ravages by her progeny, for which her predecessors have distinguished themselves.

It is generally at the close of April or the beginning of May, that this destructive moth first shows itself. The hives should therefore at that particular period be carefully watched; for if a single moth obtains an entrance, it will lay a sufficient number of eggs to cause its total ruin.

If the hive be weak in population, it is inevitably lost, unless the proprietor succeeds in destroying all the larvæ of the moths, and if they have made any great progress, there is no other resource for the bees than to drive them into another hive, provided that the season be so favorable, that they can collect a sufficiency of food for their support. It is the opinion of certain French apiarians, that the greater or less elevation of the hive has a particular effect in promoting or destroying altogether the inroads of the wax moths. They have, however, advanced that opinion, without stating their grounds for it; and we cannot possibly divine what influence the lowness or the height of a hive can have upon the attack of an insect, which by means of its wings can mount or descend at pleasure, and which is sometimes seen even crawling upon the ground. The preference, however, is given to the low position of the hive; and on this subject Feburier thus expresses himself: "If the population of the hive be numerous and the entrance of the hive very low, the bees will stoutly resist the admission of their enemies; and if some have taken advantage of a moment of neglect to introduce themselves into the hive, they attack them the moment they commence their ravages, destroy them, and repair the damage which has been committed."

Lombard suggests a singular method of destroying the wax moth; which is, to place an old hive filled with combs in the apiary, to which the moths will repair, from an instinctive sense of personal safety; the older the hive, the better. We have tried this experiment and to our cost. Having a small apiary at Peckham, and knowing that the neighborhood was much infested with the wax moth, we placed in it an old hive, according to the instructions of Mr. Lombard. The moths were not long before they took possession of it, but we found that instead of remedying the evil, we had sadly aggravated it. The moths increased wonderfully in the old hive, for it was a comfortable nursery for them; and if they had confined themselves to the old hive, we would have left them in quiet possession of their domicile, but in a very short time, we found that they had extended their visits to every one of the hives, and on turning up one of them, the moths issued out in such numbers that they resembled a swarm of bees. We hurried away with the hive into the stable-yard, and we were glad to see the poultry devour every one, which had not taken to its wings.

The death-headed moth, (*Sphinx atropos*, Linn.) is a great enemy to the bee, but it is so rare in this country, that it scarcely deserves being mentioned. In some climates, however, it is considered as a most redoubtable enemy, for according to Lombard and Huber, it not only robs the bees of their provisions, but the very sight of it frightens them to death. Mr. Lombard, speaking of this moth, says the art which the bees employ in averting the attacks of this insect is so extraordinary, that the Vaubans of the present age might take their models from them. When they see, says Mr. Lombard, one of these sphinxes approaching, they immedi-



ately retire to the very extremity of the hive, as if to hold a consultation on the most prompt measures to be adopted in order to repel the threatened attack of so formidable an enemy. It is determined *nem. con.* that a line of fortifications shall be immediately drawn out; and accordingly, in the first place, they so contract the entrance with a lump of *wax and propolis*, that the dreaded foe cannot possibly thrust his body through. Not satisfied, however, with this means of defence, they proceed to erect in the interior of the hive a double wall, then a covered way, then a secret gate, and then battlements, bastions, glacis and counterscarp.

Now Mr. Lombard does not go so far as to say that he has actually witnessed these fortifications, and therefore we will lay his account of them to the charge of a wild and incoherent fancy, and to an uncontrollable disposition rather than not to impart to us something that was new and original, to tell us something which he must have known to be decidedly false.

It is not yet a determined point whether the little insect with which the bees are afflicted ought to be classed in the rank of their enemies. It is undoubtedly a species of the louse, which is not found on any other kind of fly. It is scarcely or ever found upon the young bees, but solely upon the old ones, and it is also the old ones only of certain hives which are subject to it. In general, only one of them has been discovered upon each bee, and no great trouble is required to obtain a view of it; it is of a reddish hue and about the size of the head of a very small pin. It is almost always to be found on the corslet, but no favorable opinion is formed of those hives the bees of which are infected with these vermin. But the question is, are they in reality anywise injurious to the bees? and it may be answered, as far as our observations extend, in the negative; at all events, it is certain that they do not cause them much pain or annoyance; for, although it may not indeed be so easy to the bee to draw one of its feet over its corslet, as over any other part of its body, (and it is perhaps that very circumstance which determines the louse to place itself there,) yet it is to be seen in many places from which the leg of the bee might easily dislodge it, but where it is nevertheless allowed to remain unmolested. On the whole, these insects are considered as highly injurious to the bees, and various remedies have been proposed for their extirpation, but without any decisive success.

The fox is a truly formidable enemy in some countries; but although we once possessed an apiary in a district in which that animal abounded, we never knew a single instance in which the hives were attacked by it. Speaking of the fox as an enemy of the bee, Mr. Ducarne says: "These rascals of foxes eat the bees as well as the honey, but it is the honey to which they are the most partial. For two years, a particular fox came every winter to overthrow my hives. I put a chicken and some bread to amuse him, and some poison to kill him; but no, the cunning thief would not touch either; he went directly to the hives. Mark the sagacity of the

animal: he would not come in summer, when the bees were in full vigor, as he knew in what manner he would be received; but he steals slyly to the hive when the inhabitants are in a state of torpor, and thus obtains their treasure without incurring any danger himself."

There is, however, an animal indigenous to this country, which we dread to see in the midst of our hives, more than all the foxes in the neighborhood, and that is a pig; who, without possessing any immediate relish for the contents of a hive, will frequently overthrow it, from that restless spirit of mischief and destruction which is inherent in the animal. It is proverbial that good cometh out of evil; and we once knew a cottager who had his hives placed on the ground, when his sow with a litter of pigs after her, having obtained admission into his garden, overthrew either by design or clumsiness one of the hives. The screams of the little pigs, and the loud gruntings of the old sow, who were all furiously attacked by the bees, attracted the cottager to his garden, when he saw the damage that had been committed, and the same night witnessed the death of six of his pigs. The cottager wisely determined to place his hives beyond the reach of the old sow in future; and thus a pig effected what perhaps all the power of human reason would not have been able to accomplish.

The lizard and the common newt are great enemies of the bees; but if the hives be placed on pedestals, they are safe from the depredations of those vermin. The Abbé della Rocca describes the lizard as a truly formidable enemy, and with the view of arresting its depredations, an earthen pot glazed on the inside is put into the ground, half filled with water, the edges of it being parallel with the surface. The lizards fall into the water and are drowned, and it not unfrequently happens that a mouse falls into the same trap.

In general, it ought to be strongly impressed upon the mind of every keeper of bees, that the attacks of their enemies are generally carried on in secret, and therefore he should always be upon the alert to destroy them, before his property has received, perhaps, an irreparable injury.—*Huish.*

Independently of the interest which attaches to the apiarian art from economical considerations, and the pleasure of appropriating to one's own use the surplus produce of bee industry—a pleasure, by the way, of a very exquisite kind, as every bee-master will bear us witness—it merits, as a branch of natural history, the attention of every lover of nature and curious investigator of her secret things.

How often is the expression of surprise heard from the lips of some individual who has started an apiary, that his bees have disappointed him, when, if particular inquiries were instituted into the cause of the disaster, ten to one it would be found that his hives had been left unnoticed by him from October to May, and from May to October!

### A Bee Hunt.

BY WASHINGTON IRVING.

The beautiful forest in which we were encamped abounded in bee-trees; that is to say, trees in the decayed trunks of which wild bees had established their hives. It is surprising in what countless swarms the bees have overspread the Far West within but a moderate number of years. The Indians consider them to be harbingers of the white man, as the buffalo is of the red man; and say that in proportion as the bee advances, the Indian and buffalo retire. We are always accustomed to associate the hum of the bee-hive with the farm-house and flower-garden, and to consider those industrious little animals as connected with the busy haunts of man, and I am told that the wild bee is seldom to be met with at any great distance from the frontier. They have been the heralds of civilization, steadily preceding it as it advanced from the Atlantic borders, and some of the ancient settlers of the West pretend to give the very year when the honey bee first crossed the Mississippi. The Indians with surprise found the mouldering trees of their forests suddenly teeming with ambrosial sweets, and nothing, I am told, can exceed the greedy relish with which they banquet for the first time upon this unbought luxury of the wilderness.

At present the honey bee swarms in myriads, in the noble groves and forests which skirt and intersect the prairies, and extend along the alluvial bottoms of the rivers. It seems to me as if these beautiful regions answer literally to the description of the land of promise, "a land flowing with milk and honey;" for the rich pasturage of the prairies is calculated to sustain herds of cattle as countless as the sands upon the sea-shore, while the flowers with which they are enamelled render them a very paradise for the nectar-seeking bee.

We had not long been in the camp when a party set out in quest of a bee-tree, and being curious to witness the sport, I gladly accepted an invitation to accompany them. The party was headed by a veteran bee hunter, a tall, lank fellow in homespun garb that hung loosely about his limbs, and a straw hat shaped not unlike a bee-hive; a comrade, equally uncouth in garb, without a hat, straddled along at his heels, with a long rifle on his shoulder. To these succeeded half a dozen others, some with axes and some with rifles, for no one stirs far from the camp without his fire-arms, so as to be ready for either wild deer or wild Indian.

After proceeding some distance we came to an open glade on the skirts of the forest. Here our leader halted and then advanced quietly to a low bush, on the top of which I perceived a piece of honey comb. This, I found, was the bait or lure for the wild bees. Several were humming about it, and diving into its cells. When they had laden themselves with honey, they would rise into the air, and dart off in a straight line, almost with the velocity of a bullet. The hunters watched attentively the course they took, and then set off in the same direc-

tion, stumbling along over twisted roots and fallen trees, with their eyes turned up to the sky. In this way they traced the honey-laden bees to their hive, in the hollow trunk of a blasted oak, where, after buzzing about for a moment, they entered a hole about sixty feet from the ground.

Two of the bee hunters now plied their axes vigorously at the foot of the tree, to level it with the ground. The mere spectators and amateurs, in the meantime, drew off to a cautious distance, to be out of the way of the falling tree and the vengeance of its inmates. The jarring blows of the axe seemed to have no effect in alarming or disturbing this most industrious community. They continued to ply at their usual occupations, some arriving full freighted into port, others sallying forth on new expeditions, like so many merchant men in a money-making metropolis, little suspicious of pending bankruptcy and downfall. Even a loud crack which announced the rupture of the trunk, failed to divert their attention from the intense pursuit of gain. At length down came the tree with a tremendous crash, bursting open from end to end, and displaying all the housed treasures of the commonwealth.

One of the hunters immediately ran up with a wisp of lighted hay as a defence against the bees. The latter, however, made no attack and sought no revenge. They seemed stupefied by the catastrophe and unsuspecting of its cause, and remained crawling and buzzing about the ruins, without offering us any molestation. Every one of the party now fell to, with spoon and hunting knife, to scoop out the flakes of honey comb with which the hollow trunk was stored. Some of them were of old date and a deep brown color, others were beautifully white, and the honey in their cells was almost limpid. Such of the combs as were entire were placed in camp kettles to be conveyed to the encampment; those which had been shivered in the fall were devoured upon the spot. Every stark bee hunter was to be seen with a rich morsel in his hand, dripping about his fingers, and disappearing as rapidly as a cream tart before the holiday appetite of a schoolboy.

Nor was it the bee hunters alone that profited by the downfall of this industrious community. As if the bees would carry through the similitude of their habits with those of laborious and gainful man, I beheld numbers from rival hives, arriving on eager wing to enrich themselves with the ruin of their neighbors. These busied themselves as eagerly and cheerfully as so many wreckers on an Indianman that has been driven on shore; plunging into the cells of the broken honey combs, banqueting greedily on the spoil, and then winging their way full freighted to their homes. As to the poor proprietors of the ruin, they seemed to have no heart to do anything, not even to taste the nectar that flowed around them; but crawled backwards and forwards, in vacant desolation, as I have seen a poor fellow with his hands in his pockets, whistling vacantly and despondingly about the ruins of his house that had been burned.

It is difficult to describe the bewilderment and confusion of the bees of the bankrupt hive who had been absent at the time of the catastrophe, and who arrived from time to time, with full cargoes from abroad. At first they wheeled about in the air, in the place where the fallen tree had once reared its head, astonished at finding it all a vacuum. At length, as if comprehending their disaster, they settled down in clusters on a dry branch of a neighboring tree, whence they seemed to contemplate the prostrate ruin, and to buzz forth doleful lamentations over the downfall of their republic. It was a scene on which the "melancholy Jacques" might have moralized by the hour.

We now abandoned the place, leaving much honey in the hollow of the tree. "It will all be cleared off by the varmint," said one of the rangers. "What vermin?" asked I. "Oh, bears, and skunks, and racoons, and 'possums. The bears is the knowin'est varmint for findin' out a bee-tree in the world. They'll gnaw for days together at the trunk till they make a hole big enough to get in their paws, and then they'll haul out honey, bees and all."

The following article, which we copy from the *London Morning Star*, is a good illustration of the singular blunders which those are apt to commit who write about matters which they do not understand:

**A BEE INVASION.**—A good deal of amusement has been afforded to the people of Oban during the last eight days by an extraordinary exhibition of the thievish propensities of the bees of the neighborhood. It appears that on Thursday week a newly hived flock of Dr. Cumming's friends, headed by their queen, entered the shop of Mr. Black, fruiterer, where they proceeded to regale themselves on the dainties lying so temptingly exposed. With a total disregard to the laws of *meum et tuum*, they sucked the sweets of all that was suckable, and spoiled a good deal more than they sucked. Mr. Black, however, anxious to have a select and numerous custom, had not bargained for a queen and a few thousands of subjects, and did not appreciate the free-and-easy way in which his goods were handled, more especially as "no returns" was an axiom upon which his customers faithfully acted. The art of coaxing was brought into requisition, but without producing any effect. Ready-made honey was lying before them, and the bees appreciated to the full the delightful delicacy. The boxes were covered, hidden, removed to the most secret recesses of the shop, but in vain. The bees found them out, and sucked in with the most extraordinary avidity. They defied all efforts to eject them, and at the same time prevented more honest customers from entering the shop. At length, when it was seen that there was no probability of the flock leaving of their own accord, stringent measures were adopted. The services of two men were called in, who commenced removing the goods out of the shop. Notwithstanding this the queen and her followers continued to cling to the spot hallowed by

such sweet recollections; and it was only when that fatal enemy of the bee tribe, the dreaded brimstone, mingled with chloroform, was introduced, that the marauders succumbed, the queen bravely dying amid her devoted followers. The bees, however, had held possession for thirty-six hours, and had shown an example which others were not slow to follow. The forenoon after the suffocation a fresh relay of bees paid Mr. Black a visit during the warm hours of the day, leaving in the evening, or whenever they had filled their honey bags. Others succeeded as soon as the first visitors left, rendering it impossible for people to enter the shop during several hours each day. All the bees in the neighborhood seemed to have received the hint, and particular directions as to the locality of Mr. Black's premises, which still continue to be the favorite resort of all the bees about Oban. The wasps have even discovered the scent, and have put in a most respectable appearance, mingling with their more valuable sisters as though they were bees of the most unimpeachable character. It is due to the thieves, however, to state that they kept their stings faithfully sheathed, and have never lost their amiable temper.—*Glasgow Morning Journal*.

**PRIMITIVE BEEHIVE**—The following mode of keeping bees has been practiced in India for a long period, and is said to be very successful:

"As honey forms a favorite article of food among the Himalaya highlanders, they have a very extensive sale for it; it is therefore with them a great article of internal commerce, in fact, the staple of their bazaars, where it always finds a ready vent. They obtain the honey without destroying the bees, by means of a hollow cylinder of wood inclosed in the wall of their huts, on the side most sheltered from the weather, and in which there is an opening without for the bees to enter. In the centre of this hive there is a movable division which is kept open while the bees are making their honey; but as soon as the combs are full, the busy family is driven out by a noise made through the inward extremity. As soon as they have retreated, the central partition is closed and the combs are drawn out of the cylinder from the opening on the inner wall. The honey being secured, the hive is again opened and the bees commence their interminable labors of reproduction."

It has been judiciously observed, that "no one who pays a fair amount of attention to the management of those very interesting insects, the bees, will ever willingly relinquish the keeping of them." Carelessness and indifference alone find the incidental difficulties insurmountable, and they deserve to do so.

To be successful in bee-keeping, there must be a sufficient experience in bee management, whether derived from a practical acquaintance with the subject, or from a diligent study of the best treatises and manuals of instruction in the matter.



## Parasites of the Honey Bee.

BY DR. E. ASSMUSZ, OF LEIPSIG.

The term parasite, in its proper sense, is understood to embrace every living being (animal or vegetable) which is found on or in any other living being and deriving sustenance therefrom by appropriating or absorbing its juices.

The expression, parasites of the honey bee, will accordingly include all those creatures and plants which are found on or in living bees or their larvæ, and derive their nourishment from them. This will of course include the *Braula caca*, which lives on the bee and absorbs its juices, as well as the *Mermis albicans*, which infests the interior of the body and subsists on the fatty substance. But it would not embrace the larvæ of the *Meloe*, which simply uses the body of the bee as a medium whereby to obtain entrance into the hive, and having attained its object, forsakes the bee and sustains itself at first by devouring the unhatched eggs in the cells, and subsequently lives on the pollen or bee-bread stored up in the combs. This mode of living cannot, strictly speaking, be called parasitical, as the larvæ of this insect manifests itself in the hive as a depredator, first by devouring the eggs, and subsequently subsists on some of the accumulated stores of the bee. In the later stage of its existence, therefore, it is rather a *sponger* than a parasite.

In like manner, the larvæ of the *Trichodes* are not to be deemed parasites in the strict sense of the term, but as despoilers rather, making the bee-brood their prey. If the larvæ of the bee lived, not in the cells of the combs, but in the open air, they would unquestionably be pursued by the larvæ of the *Trichodes*, just as those of the *Colosoma inquisitor* or *Colosoma sycophanta* pursue and destroy caterpillars on the ground and on trees. But if the larvæ of the *Trichodes* are to be classed among parasites, as is sometimes done, we should in like manner have to rank as parasites both the *Colosoma* and the larvæ of the *Carabiceides* in general, and even the perfect insects likewise. This would necessarily extend the term "parasite" so as to embrace the greater number of animals. Thus we should, by analogy, be warranted in considering the lion, the otter, &c., and in brief all carnivorous and insectivorous animals as animal parasites; and as plant parasites, all such as subsist on vegetables. But no one has yet ventured to call these *parasites*.

When I thus class the larvæ of *Trichodes* and *Meloe* among parasites, I do so partly because distinguished zoologists regard them as such, and partly because they condition the diagnosis of several diseases of the bees, which is one of the chief ends of this essay to describe.

Parasites are subdivided into Ecto-parasites, which live on the surface of plants and the exterior of animals, and Endo-parasites, which are found in the interior of the one and in the viscera of the other. They are furthermore distinguished as transitory, that is, such as only occasionally afflict their victims, as fleas, flies, mosquitoes, &c.; and as permanent, that is, such

as are constantly present during a longer or a shorter period, or even during life. The latter are again divided into constant or periodical, according as they are found on or in their victims at all times during life, or only at particular times or seasons, till they have attained sexual maturity or have undergone one or more metamorphoses.

The number of animal parasites which infest the honey bee is not large, as compared with those which infest other species, such as the humble bee, &c. Exclusive of the larvæ of *Trichodes* and *Meloe*, there remain only four genera with one species, namely, *Phora rassa*, *Braula caca*, *Gordius subbifurcus*, and *Mermis albicans*, hitherto found parasitically infesting the honey bee. The other insects yet observed in the hive, such as the larvæ of the wax moth and of the clothes moth are not parasites of the bee; neither is the pollen mite, since it does not infest the body of the bee or derive subsistence thence, but lives on pollen. *Gamasus coleoptratorum*, found plentifully on humble bees and various bugs, is in no respect a parasite of the honey bee. It sometimes indeed may casually be found on the body of a bee, but it is evidently there as an estray, and is always eager to leave.

The larvæ of *Trichodes albearius* are unquestionable parasites of the honey bee, (in the generally accepted sense), though found abundantly in the nests of the mason bee. They may possibly also infest our honey bee, since the larvæ of its congener *Trichodes apiarius* Linn., are found in bee hives, as well as those of *Serropalpus barbatus*, belonging to the family of *Melandryidae*.

It can scarcely be doubted that additional species of parasites will in course of time be found on this hymenopterous insect. Thus, for instance, we may fairly suspect *Gordius aquaticus* and *Mermis nigricans* infest the honey bee, since they are found, without exception, in the various species of insects of all classes.

Of the four parasites above mentioned, as being found on the honey bee, the first two are Dipterous, and the other two are Nematodei. Of the former, *Braula caca* alone is an ectoparasite of the constant or life-long class. The remaining three, *Phora incrassata*, *Gordius subbifurcus* and *Mermis albicans*, are endoparasites, and periodically permanent.

I include the larvæ of *Meloe cicutricosus* in my list, (though it has not yet been detected on the honey bee), because I could give only what may be termed fragmentary accounts of the larvæ of *Meloe variegatus* and *Meloe proscarabæus*, since the series of transformations which these undergo is not yet fully ascertained. But as the primitive larvæ of the genus *Meloe* so greatly resemble each other, we may assume that the subsequent transformation—the second larval state, the pseudochrysalis, and the third larval state, which scarcely differs from the second—as likewise the pupæ of the remaining species of *Meloe*, correspond with those of *Meloe cicutricosus*. It is only thus that any probable account of the transformations of this species of *Coleoptera* could be given.

## Diversity of Size.

Deviations in size from the ordinary standard are common among bees, but are more frequently observed among queens and drones than among workers. We shall first notice those among drones, which are three-fold—large, medium, and small. Large drones are those bred in drone cells, proper, and are such as we commonly see about hives in summer. Medium sized drones are those bred in worker cells covered with concave or meniscus-shaped caps. The Germans call them "buckelbrut"—*hump-brood*—from the humped appearances of the worker comb, in which they are bred. They are usually of the full length of ordinary drones, though considerably more slender, the narrowness of the worker cell preventing the full lateral development of the embryo insect, while the concave cap permits it to attain its normal length. Small drones are such as do not exceed the workers in length, though they are somewhat thicker. I can account for their origin only by supposing that the workers sometimes err when sealing up worker larvæ, giving them flat covers instead of concave. The curvature of the cap is scarcely perceptible, and seems to be produced, not by design of the bee, but by pressure from within, the round head of the nascent drone being forced up flush against it, causing it to *bulge* upward. This flat covering of the cell represses the longitudinal growth of the insect, and limits its length to that of an ordinary worker. I have, says Berlepsch, occasionally found them fully developed and fully mature, yet dead in their cells, the head appearing to have been so firmly pressed against the inside of the cover, that the ripe drone was unable to use his mandibles to cut his way out, and died literally of starvation. These drones are generally met with in the spring, rarely in summer; at times only one here and there in the cells of a worker comb, and again four or five clustered together. So deceptive is oft-times the appearance of these misapplied cells, that it is not till their inmates are seen emerging that they are ascertained to be drones. An examination of the neighboring cells usually reveals the fact that they too are similarly misused, and that a batch of diminutive drones is maturing, to the ruin of a colony which needed strengthening by the accession of a fresh generation of workers.

"Only on one occasion," says Berlepsch, "did I see these small drones make their appearance in large numbers. In the summer of 1856, I observed a multitude of them issuing from a populous colony, in a movable comb hive in my apiary. I made an immediate examination, and found there were at least five or six thousand such small drones present, with not less than twice that number maturing in the cells. Not a single worker was subsequently produced, though the queen had previously laid worker eggs in abundance, and the brood was as regularly and compactly stowed in their cells as if it had proceeded from a healthy and highly prolific normal queen. The only perceptible difference was in the slight curvature, or bulge,

of the cover. The queen was marching about on one of the combs with stately step. She was large, vigorous, and very fertile, dropping eggs while I was examining her. I can only account for this extraordinary case, on the supposition that from some unknown cause or casualty, the queen suddenly lost her ability to lay worker eggs; and that the workers, accustomed to cap appropriately a large number of worker cells daily, continued to do so from habit, even after the queen became an unconscious drone egg layer. The drone brood in the worker cells was thus inadvertently sealed over with flat covers."

Workers emerging from cells in which many successive broods have been reared, are commonly somewhat smaller than those bred in new combs, as the silken cocoons in which the larvæ envelope themselves preparatory to their first transformation, adheres to the sides of the cell when the mature bee leaves, and thus contracts its diameter. Here the difference is not so great usually between the workers in the same apiary as to be strikingly obvious.

But occasionally very diminutive workers—veritable Lilliputians, in fact—have been seen in considerable numbers in some colonies, being at the same time fully as active and industrious as, and seemingly more nimble than, those of larger growth and development. Berlepsch says he has casually seen them in his own apiary, though they were always few in number. Mr. Lubiniecki states that, in August, 1856, he was surprised by the sudden appearance in one of his hives of several thousand dwarf bees, not larger than the common house fly. Four of these little creatures did not together equal an ordinary worker in size. It was amusing to see these diminutive busybodies bustling about among their larger companions, seemingly as intent as any others on household cares. No one could restrain his laughter on witnessing their return from foraging excursions, with miniature pellets of pollen on their attenuate thighs, or on beholding their adroit and fearless resistance when attacked by marauders from other apiaries. Small as they were they were armed with stings like their full grown brothers, and gallantly did they know how to wield them. On examination Mr. Lubiniecki found that they had been bred in a comb which had broken loose from its moorings and settled down on the bottom between two others, thus partially compressing a large proportion of the cells.

Mr. Glas, in a communication to the *Bienenzeitung*, says he had in 1858, a small and very slender Italian queen which produced diminutive workers exclusively, in worker cells of the ordinary size. It was laughable to see these Lilliputian workers passing in and out of their hives, with apparent anxious haste eager to appropriate the spoils which a propitious season and mild weather proffered in profusion. It is much to be regretted that Mr. Glas did not rear young queens from the brood of her miniature majesty, and take the other measures needed to perpetuate the dwarf race. Had he succeeded in this, he would have facilitated the solution

of some interesting questions in the physiology of insects, and perhaps have led to the more full discovery of the laws which regulate the deterioration or improvement of races. Some other intelligent apiarian may hereafter have casually an opportunity to make experiments in that direction, which it is to be hoped will not be allowed to pass unimproved.

### Extent of Bees' Flight.

The question of the distance to which a bee can extend its flight is not of that minor importance which some persons may be disposed to attach to it, and it is from a total neglect of or indifference to it, that the ruin of many an apiary is to be attributed. It may also be confidently affirmed that the comparative excellence of the position of an apiary depends in a great measure on the greater or less distance which the bees have to fly for their food; for it is a rational deduction that the bees, who have to travel three or four miles to the fields of their pasture, cannot collect an equal quantity of honey with those who have to travel only half a mile; as the latter can make four journeys, whilst the former can only make one, independently of the consequent risk which the bees incur who have to travel to a great distance, by having to cross rivers and lakes, and of being dashed into them by the wind, or destroyed by some of those other numerous accidents to which the bees are so liable.

It has been ascertained that the bees of an apiary whose fields of pasture are situate at a distance, are much shorter lived than those whose food is in the immediate vicinity; and this arises chiefly from two causes: first, the various dangers to which their longer flights expose them; and secondly, to the wear and tear of their wings, which in the end become so torn and lacerated, that the bees can no longer prosecute their labors, and they either die in the fields, or from hunger in the hive. We had a very striking proof of the truth of the foregoing remarks in the establishment of a small apiary in the vicinity of Brighton for the late Sir Thomas Clarges. The immediate environs of the town being composed of mere down lands, little or no food could be found for the bees, with the exception of a scanty supply, which could be gathered from the few straggling flowers cultivated in the gardens in the immediate vicinity of the place. The consequence of which was, that although the bees contrived to gain a scanty subsistence, yet we could not succeed in a single instance in obtaining more than one or two pounds of honey from each hive, the bees being in the Huish hive; and even that small portion which was taken from them was done at the risk of them perishing in the winter for want of food. Finding the situation so very bad for an apiary, we had the hives removed to a cottager's garden at Pagham, where they thrived remarkably well, and yielded a rich harvest of honey.

It has been stated by some of the encyclopedists that the flight of a bee extends to four

miles, and this is said to have been determined by the color of the farina of certain plants being seen on the legs of the bees, which did not grow within the distance of four miles from the apiary. We, however, consider this criterion to be very defective and indefinite, for the color of the farina of plants varies so little in its shade, being almost universally of a yellowish tinge, that it would almost amount to an impossibility to determine the particular flowers from which it is gathered. It is true that we have seen the pellets of farina on the legs of a bee of a dark slaty color, but it would be at best arriving at a random kind of a conclusion to determine the extent of the flight of the bee from the mere color of the farina, unless it had been unequivocally ascertained that no flowers whatever flourished in the immediate neighborhood from which the farina of such a particular color could be obtained. We had once an apiary situate about three miles from a range of hills which were covered with heath, and knowing the richness of that shrub in honey, we purposed removing our hives to the immediate vicinity of so rich a pasturage. Previously, however, to our undertaking the transportation of the hives, we determined to ascertain whether the heath was within the range of the flight of our bees, for which purpose we adopted the following expedient. We put some flour in a small pepper-caster, and proceeded to the hills, leaving a person with the hives to keep a strict watch upon them, with a view of ascertaining whether any bees returned to the hives sprinkled with flour. We were not many minutes at the hills before we discovered a number of bees collecting the honey, every one of which we besprinkled well with flour. On our return home we were informed that a considerable number of bees had returned with the sprinklings of the flour, and in fact some of them with their miller's jackets on were observed to leave the hive again, and dart away in the direction of the hills. Thus the fact was indisputably ascertained that the rich pasturage, although three miles distant, was within the range of the flight of our bees, and therefore we desisted from our project of removing them. Another corroborative proof of the extent of the flight of the bee was obtained during an excursion which we made with Bonner, to the Isle of Bas, at the entrance of the Firth of Forth, which is mostly covered with heath, and on which, to our great surprise, we saw a number of bees collecting their honey. As not a single hive was kept on the island, it was clear that the bees must have winged their way over the water either from the Lothians, or the coast of Fife, the former being about four miles, the latter about eight miles distant. We felt a great desire to ascertain from what quarter the bees had arrived at the Isle of Bas, but the solution of the question was attended with such almost insuperable difficulties, that we were obliged to relinquish our project. We had, however, so far ascertained the point, that the bee will fly above four miles in search of food, and not over even a campaign country, but over the very waves of the ocean. What a most wonderful instinct



must that be which can teach an insect to direct its flight to the distance of four miles, over an expanse of water in search of its food, of the existence of which even it cannot be supposed to possess any knowledge! L'Abbé della Rocca indeed says, that it is the sense of smell which guides the bee to its distant fields of pasture, and in many respects we coincide in the opinion of the worthy Abbé, for certainly nothing can be more acute and powerful than the sense of smell in the bee. In other respects, however, it exceeds our belief, that the sense of smell can possibly be so acute as to direct the bee to an uninhabited island, situate nearly five miles from the main land, to collect its honey from the flowers of a shrub which at no time emit any exquisite odor, and which must necessarily be neutralized, if not wholly destroyed, by the saline exhalations of the ocean.

It was the opinion of Dr. Chambers that the bee cannot extend its flight much beyond a mile, and Dr. Hunter was of the same opinion; we are, however, inclined to believe that both Chambers and Hunter adopted their opinion on the authority of Schirach, who affirms that the bees cannot extend their flight beyond *one mile*; but then it should be taken into consideration that the German mile of Schirach is equal to about three and a half miles English, and from that very circumstance may be traced all the errors which the numerous commentators, both French and English, on the works of the German apiarians have fallen into in calculating the extent of the flight of a bee. The traveling apiaries of Germany, particularly those of Hanover, are regulated by the prevailing opinion that the bee can and does extend its flight to four and even five miles; and acting upon that supposition when the bee-masters move their apiaries, they always travel about two *stunden*, that is about eight miles, as they then calculate that the bees are beyond the former range of their pasture by four miles. A traveling apiary of eighty or one hundred hives will exhaust the food within the area of a circle of four miles in about a fortnight or three weeks; it is, however, a remarkable circumstance, that the honey collected *solely* from heath, without the admixture of the produce of any other flowers, is of an unpleasant flavor, and of a dark, muddy color; in fact, in commerce the worst kind of honey is known by the name of heath honey, and the most adulterated that is brought to market, for which reason the honey of Germany bears in our markets the most inferior price.

It was the opinion of Huber, that the radii of the circle of the flight of the bee extend beyond *one mile*, but the translator of Huber has in the promulgation of that opinion fallen into the same error as the adherents of Schirach. It certainly stands in the original of Huber as *eine Meile*; but then a mile of Huber is equal to nearly four English, and thus is Huber made to disseminate an error from the culpable ignorance of the translator, which is a gross impeachment of his own judgment.

It cannot for a moment admit of a doubt, that all positions are not equally favorable to the culture of the bee, and we wish to impress it

strongly on the mind of every keeper of bees, that it is a hopeless task to attempt to support an apiary by artificial means; that is, by the sowing and planting of a few flowers and shrubs in the immediate vicinity of the bees, from which they are known to collect their honey and farina. The bee in general despises all cultivated flowers, and will pass by them with disdain to luxuriate on the common furze, the broom, the willow, the hawthorn, or the blackberry of our common hedges. We do not hereby mean to dissuade the bee-master from cultivating in his garden and grounds those shrubs and flowers from which the bees derive their nourishment; but a hedge of furze and broom, or a field of wild mustard or white clover, commonly called cow-grass, is higher appreciated by the bees than all the flowers which bloom in a garden; in fact, the most commonly cultivated flowers of our gardens, such as the rose, the pink, the carnation, the dahlia, the chrysanthemum, the hyacinth, the auricula, the polyanthus, &c., are all despised by the bee, and passed by as utterly unworthy of its notice.

The knowledge of the particular produce of a country, its localities, and the greater or less extent of its cultivation ought to form a part of the study of every keeper of bees. A highly cultivated country is by no means beneficial to the bee, for as soon as the harvests are got in the fields are a complete desert to the bee. A country that is not intersected with hedges is equally unfavorable, for it is from them that the bees collect the greater part of their provisions. The hedges in general abound with the blackberry, the furze, the broom, the wild-rose, the marsh-mallows, &c., &c., independently of the rows of elm, oak, horse-chestnut, lime, &c., from all of which the bees collect a considerable quantity of honey and farina. The fields studded with the useless daisy are a desert to the bee; but it is the fields which are whitened with the buckwheat, the plains which are gilded with the flower of the wild mustard, the turnip, and the whole of the brassica tribe that furnish the bees with a continual supply of food, and in which they love to disport, leaving the gaudy flowers of the garden "to waste their sweetness on the desert air."

In regard to the number of hives which any particular tract of country can maintain, various and conflicting opinions have been hazarded; for whilst some consider that a country cannot be overstocked on account of the supposed inexhaustible supply of food which the vegetable kingdom is continually producing and reproducing, others maintain, and with a greater show of reason, that analogically considered, a country may be overstocked with bees on the same principle that a field may be overstocked with cattle, and therefore that in every species of stock the number ought to be restricted to the means of subsistence. We certainly have no reason to fear that any part of this country will be overstocked with bees, for we scruple not to affirm that where one hive is now kept, fifty might be kept without running any risk of overstocking the country. The average number of hives in the apiaries of this country does

not exceed five, and we know of only one apiary which ever reached the number of sixty, and that was at Cobham, in Kent. The proprietor however was a perfect charlatan in bee-keeping; the aspect of his hives was not of the slightest consideration to him, for they faced all the points of the compass; and to attempt to instil any instruction into him relative to the improved method of keeping bees, was similar to driving a gimlet into a block of marble. We were introduced to this most eccentric of all bee-masters by the late Mr. Stevenson, the steward of the Earl of Darnley, and on beginning to expatiate with him on several instances of his bad management in his apiary, he very coolly insisted that Mr. Stevenson and myself should leave his premises, for, according to his own opinion, he was the only man in England who understood the management of bees. Nothing could give him greater offence than to ask him to sell a hive, for he had formed a resolution to die with an apiary of one hundred hives. At his death, however, his apiary amounted to only forty hives; and may not this be adduced as a proof that he had over-stocked the particular district in which he lived?

There are very few districts which will support an apiary of sixty hives in one position. Twenty-five hives are the utmost which we would recommend any bee-master to keep in one apiary, with a view to actual profit; and even that number is too great, if the country be not of the first-rate character. The better practice is to keep rather too few than too many; and it will be found, on experiment, that ten hives in certain situations will generally yield as much as twenty. It was, it is true, the opinion of M. La Grenée, whose character stands high in the rank of apiarians, that any given district can maintain an unlimited number of hives, but neither experience nor reason will bear him out in his hypothesis. It must be granted that every district, however rich and abundant it may be in the flowers from which the bees collect their provisions, still has its limits of supply; and, consequently, if a certain number of hives be kept in a district which can consume that supply, and which is not greater than they require, any further addition to the number of hives must be attended with the greatest injury.

We will now mention those positions which are most proper and advantageous for the culture of the bee, and they may be divided into three; the first middling, the second good, and the third excellent. These three positions may be distinguished as yielding three different productions.

The corn-fields, the meadows, with little rivulets, are what may be denominated the middling position.

The proximity of woods—abundance of meadow and arable ground, extensive commons and rivulets, form the good position.

The vicinity of meadows of heath, woods, great commons and hills covered with odoriferous herbs, removed from lakes and rivers of great extent, may be denominated the excellent position; the latter will produce four times as

much as the first, and will double the second. Although these positions may be considered as the best, there are nevertheless other places where hives might be placed to advantage, but not in that number which might be wished. The quality of the country in which a person fixes his apiary should be examined, and he should regulate the number of the hives to the quantity of food which the district can produce, and not place a hundred hives in a place which can only maintain fifty.

Respecting the number of hives which may be kept in a middling district, we conceive that one hundred are perfectly sufficient; two hundred in a good one, and four or five hundred in an excellent one. In regard to those provinces that we have mentioned, in which, from their high state of cultivation, the harvest of honey ceases in August, they may still be proper for the culture of the bee, although not to that extent as in the positions previously quoted.

Huber, speaking of the advantages of particular positions for an apiary, says, that at the epoch of the Revolution he lived at Cour, near Lausanne; on one side was the lake, and on the other vineyards. He soon perceived the disadvantages of his situation. When the orchards of Cour were out of blossom, and the few neighboring meadows mowed, he perceived that the provisions of the mother hive diminished daily; the labors of his swarms ceased to that degree that his bees would have died from hunger in the summer if he had not supported them; and his apiary, which had taken him years to collect, was entirely ruined.

Whilst his hives were thus going to destruction at Cour, the bees of Renan, of Chablère, of the woods of Vaux, Cery, &c., places situated about eight miles from Cour, without any lakes, woods, or mountains intervening, lived in the greatest abundance, threw numerous swarms, and filled their hives with wax and honey. If my bees, says Mr. Huber, could have cleared the interval which separated them from the places where they could have found provisions, they would certainly have done it, rather than die from hunger. They did not succeed better at Vevay, although the distance is not quite six miles from Vevay to Houteville, Chardenne, where the bees flourished particularly well.

In concluding this article, we regret to say that from the present degraded state of the culture of the bee in this country, there is no fear of its being over-stocked with hives. The climate of this country is particularly congenial to the multiplication of bees, but we are either not aware of the profit attending their culture, or some old-rooted prejudices are required to be extirpated before the attention of the agriculturists can be invited to this important branch of rural economy.—*Huish.*

The management of bees, which always requires some delicacy, and not a little dexterity of treatment, assuredly demands no less attention and care than other matters of a similar nature.

## THE AMERICAN BEE JOURNAL.

WASHINGTON, AUGUST, 1866.

THE AMERICAN BEE JOURNAL is now published monthly, in the City of Washington, (D. C.,) and all communications should be addressed to the Editor, at that place.

Will our editorial brethren who receive this number of the AMERICAN BEE JOURNAL, notice the resumption of its publication, and at the same time favor us with an exchange? We shall take pleasure in reciprocating the favor in any way in our power.

All who are interested in the subject of bee culture, are respectfully requested to contribute to our columns. Inquiries, suggestions, and communications shall have prompt attention.

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Will those who are disposed to encourage this renewed effort to establish a periodical devoted to bee culture, oblige by sending us the name and address of practical bee-keepers in their respective neighborhoods.

## Bee Culture in Australia.

For some years past much attention has been paid to bee culture in Australia. The Italian bee has been introduced, and has distinguished itself by its superiority over the common bee, in prolificness and productiveness. Their principle source of supplies the bees find in the very profuse blossoms of the *Eucalyptus globosus*, a tree which grows with astonishing rapidity, and when carried to Algeria, retains its Australian habit of blossoming in September, at about the period of the autumnal equinox. Several other species of this class of trees, which constitutes ninety-nine per cent. of the Australian forests, are especially adapted for the support of the honey bee—namely, *Eucalyptus gigantea*, *odorata*, *rostrata*, *amygdalina*, and *sideroxyton*. So likewise are several species of *Acacia*, namely, the *Acacia melanoxyton*, *pycnacantha*, *mollissimi*, and *dealbata*. These also have been successfully introduced into Algeria.

When the European bee was first brought to Australia (about twenty-five years ago) it excited but little interest, as the mass of the people were actively engaged in what were then more profitable pursuits. But the extraordinary rapidity with which the bees multiplied in that mild climate, filling the forests on the heights around Melbourne and in the interior with wild swarms, soon arrested the attention of the gold diggers, and led many of them to engage in bee culture, thereby replenishing their collapsed purses, and reviving their sunken spirits.

The Italian bee was introduced there by Mr. Edward Wilson, who sent three colonies from London, November, 1862, on board the "Princess Royal," which arrived at Melbourne on the 2d of February, 1863. According to a report published by Mr. Templeton, in the "*Yeoman and Australian Acclimatiser*" of February 6, 1864, two of these colonies perished during the voyage, but the third contained a few living bees on its arrival, among which fortunately was the queen. As the small number of workers could not maintain sufficient heat in the hive in which they came, they were transferred to a smaller, and the queen at once began to lay eggs, and at the close of February young bees made their appearance. Before the end of the month, the Goodling hive, fourteen and a half inches by nine, was filled with comb and honey, and another of equal size before the end of summer. From this double hive an exceedingly large swarm issued, followed in due course by two strong afterswarms. The original colony produced two more swarms before Christmas (the Australian midsummer), so that on the whole the increase was six-fold the first year; notwithstanding the discouraging mishap at the start. A seventh swarm made its appearance on the 7th of February, and there was reason to believe that another absconded unnoticed. Stocks of Italian bees are sold in Australia at £10 sterling each.—*Dr. Otto Busch.*

Winter feeding of bees is by no means to be recommended, *except in cases of extreme necessity*. Most writers name too late a period for supplying the deficiency of a hive's weight, when they mention October as the most suitable feeding time. September, or soon after the foraging season is fully over, had much better be chosen for the purpose; as the bees can then quickly carry up the proffered supplies, and cap the honey they deposit in the cells.

The improved system of bee culture is apt to be condemned by the old fashioned and stand-still bee-keeper, whose prejudices are ever prone to carry him back to the days of his grandmother, instead of permitting him to examine candidly the results of prolonged modern experience.

Second swarms rise with greater readiness than first swarms, as well on account of the crowded state of the hive, as because young queens are known to be less dependent on the weather than the old ones.



### Artificial Queens.

By far the most wonderful circumstance in connection with the natural history of the bee, is the *artificial production of a queen bee from a worker grub*, should the hive by any mishap be left without a ruler.

To the uninitiated this phenomenon would appear nothing short of a miracle, for it not only seems to necessitate highly developed reasoning faculties in the insect, but would denote that it possesses greater influence in the direction and modification of the laws of nature than do we ourselves.

True it is that we can engraft one species of plant upon another, and produce a hybrid by select fertilization, or that we can hatch an egg by artificial incubation. But is there anything in our power over nature that will enable us to obtain a result at all approaching that of the conversion of a worker larva into a queen bee, as performed by these insects?

Although the operation will always remain a very wonderful one, especially as regards the instinct that guides the bee in its performance, yet, when it is considered in connection with the ascertained phenomena in the development of the insect, it will lose some of its mystery. But it will at the same time acquire additional interest; for let us here remark, that however marvellous some of the operations of nature may appear to those who are unacquainted with her laws, her attractive features are considerably enhanced when they come to be more fully understood and appreciated.

The chief differences between the conditions necessary for the rearing of a queen and a worker are, that in the former the egg is deposited in a large oval vertical cell, and the insect is fed during the whole of its larval existence upon royal paste, a food elaborated by the bees in their digestive organs. Whereas the worker is reared in the ordinary horizontal hexagonal cell, and after a certain number of days (according to most authors, on the third day after its birth), its food is changed, and it is nourished with a mixture of honey and pollen. The result of this modified treatment in the worker is, that its female reproductive organs, ovaries, &c., are but imperfectly developed; and as a rule, it is rendered incapable of oviposition.\*

Now, if, instead of feeding these worker larvae only three days upon royal paste, they were nourished on this species of food during the whole of their larvahood, and if the other conditions as to dimensions and position of the cell were complied with, precisely the same as in the case of the queens, it is quite clear that the worker larva (which we know to proceed from an egg similarly fertilized as that of a queen,) would in due time become metamorphosed, not into a worker bee, but into a queen, with fully developed organs of reproduction.

Whether this is known to the bees, or only to their Creator, we are unable to say; but cer-

\*Whether it is, however, that the workers bred in the vicinity of a royal cell sometimes receive royal food in mistake, or from whatever other cause, it is certain that they occasionally oviposit, but in all cases unfertilized eggs, from which drones only proceed.

tain it is, that when deprived of their queen they speedily proceed to a cell containing a worker egg not yet hatched, or, wonderful to relate, a larva not more than three days old (the time, you must remember, when, under ordinary circumstances, its food would be changed!) and they at once alter the conditions of its early existence, so as to convert it into a queen.

They enlarge the worker cell by the destruction of those surrounding it, slaughter the inmates of these without mercy, and, by the union of the horizontal ones that have been destroyed, form a single vertical cradle. They then continue to feed the young larvæ upon royal paste during the whole of the first period of her life, and treat her in every respect as the future heiress of the throne, into which she in due time becomes metamorphosed.—*Samuelson*.

### Statistics of Bees.

There are fourteen Bee Societies in the kingdom of Hanover, eight of which—comprising 1127 members—are connected with the "Central Union." These are:

1. Landesbergen, .....	503 members.
2. Knesbeck, .....	117 "
3. Osnaburg, .....	187 "
4. Syke, .....	42 "
5. Fallersleben, .....	36 "
6. Werlte, .....	139 "
7. Hanover, .....	62 "
8. Göttingen, .....	41 "

There are 200,000 hives of bees in the kingdom. The government placed 500 rixdollars in the hands of the "Central Union" last year, to be used for the encouragement of bee culture.

Bee-keepers, when visiting me, have frequently said, "you would not dare to handle our bees as you do yours. Ours are more irritable, and would not stand such treatment." Yet when I returned their calls, and subjected their bees to similar manipulations, they proved to be just as manageable as mine, much to my amusement and to the amazement of their owners. These people are too seldom about their bees, and stand off shy and timid when near the hives. When some operation must be performed, it is done hastily and noisily, by jerks, and sudden starts. It is hence not surprising that their bees are almost always in ill temper and sometimes become furious. Much, if not everything depends on treatment, and the "law of kindness" will ultimately assert its rightful influence here also.—*Gerasch*.

Bees should have convenient access to water, especially in the spring. In very dry weather, too, it is almost essential to the existence of an apiary, that the bees be supplied artificially, if there be no rippling streams or other suitable waters at hand.

\*It is now ascertained that larvæ five and even six days old may be successfully employed for this purpose, and occasionally are so used by the workers.

### A Usurping Worker.

[The following is communicated to the *Bienenzeitung* by Mr. A. Semlitsch, an experienced and trustworthy bee-keeper, residing at Gratz, in Austria:]

"Queen bees do not usually begin to lay till forty-eight hours after having had concourse with a drone, and it would hence seem probable that several days at least might be required to qualify a fertile worker for oviposition. The following facts lead to a different conclusion: I gave an Italian queen to a strong artificial colony, which at first appeared to have accepted her, but gradually manifested increased evidence of discontent. On the sixth day I examined the hive, and found the queen enclosed in a cluster of workers. I dispersed them by a few whiffs of smoke, and the queen moved off uninjured and active among the crowd of other workers. I then observed a fine royal cell on one of the combs, which I destroyed, and closed the hive. Re-opening it two days later, I noticed a similar state of affairs, but on liberating the queen found her so much injured that she died in fifteen minutes from the maltreatment she had undergone. Two more royal cells had been started, which I permitted to remain, under the impression that they had been supplied with eggs by the queen now dead. Not till I discovered that I might wait till "the Greek calends" before a living creature would issue from these cells, did I suspect the truth; and on closer examination I found drone brood exclusively in the worker cells, and in the royal cells dead and putrefying larvae. Here was manifestly a case where a fertile worker, while a queen was present in the hive, began to lay eggs, supplanted the queen, and finally usurped the throne."

It is to be regretted that Mr. Semlitsch did not ascertain whether any eggs were laid by the finally rejected queen, after she was introduced.

### A Singular Hive.

The wild honey bees, too, in their several species, had peculiar charms for me. There were the buff-colored carders, that erected over the honey-jars domes of moss; the lapidary red-tipped bees, that built amid the recesses of ancient cairns and in dry old stone walls, and were so invincibly brave in defending their homesteads that they never gave up the quarrel till they died; and above all the yellow-zoned humble-bees, that lodged deep in the ground along the dry sides of grassy banks; and were usually wealthier in honey than any of their congeners, and existed in larger communities. But the herd-boys of the parish, and the foxes of its woods and brakes, shared in my interest in the wild honey bees, and, in the pursuit of something else than knowledge, were ruthless robbers of their nests.

I often observed that the fox, with all his reputed shrewdness, is not particularly knowing on the subject of bees. He makes as dead a set on a wasp's nest as on that of the carder or

humble bee, and gets, I doubt not, heartily stung for his pains; for though as shown by the marks of his teeth, left on the fragments of paper combs scattered about, he attempts eating the young wasps in the chrysalis state, the undevoured remains seem to argue that he is but little pleased with them as food.

There were occasions, however, on which even the herd-boys met with only disappointment in their bee-hunting excursions; and in one notable instance the result of the adventure used to be spoken of in school and elsewhere as something very horrible. A party of boys had stormed a humble bee's nest on the side of an old chapel-brae, and, digging inwards along the narrow winding earth passage, they at length came to a grinning human skull, and saw the bees issuing thick from out a round hole in its base—the *foramen magnum*. The wise little workers had actually formed their nest within the hollow of the head once occupied by the busy brain; and their spoilers, more scrupulous than Sampson of old, who seems to have enjoyed the meat brought forth out of the eater and the sweetness extracted from the strong, left in very great consternation their honey all to themselves.—*Hugh Miller.*

### A Normal Colony.

In the latter part of spring or the early part of summer, a complete community of bees comprises—first, one *queen*, the mother of the hive, a perfectly developed female; secondly, from six hundred to eight hundred *drones* or males; and, thirdly, from fifteen thousand to twenty thousand *workers*, to whom, though they are occasionally known to lay fruitful drone eggs, we may give the appellation of neuters.

The office of the queen bee is to lay all the eggs that are hatched in the hive. She is moreover the constitutional head of the colony, for, although she does nothing (so far as we know) but add to its numbers, yet should she be accidentally or designedly removed, anarchy at once reigns in the hive. And if at such a juncture there be not one of the royal family on the way from larvahood, the constitutional bees at once proceed, by a wonderful instinct, and a remarkable artificial contrivance, to manufacture a fresh head for the State.

Of the drones little is known, for they rarely leave the hive, except about noon on warm days; and the sole purpose for which such numbers are produced would appear to be sufficient to ensure a consort for the queen when she leaves the hive on her wedding tour.

Though there has been so little opportunity of investigating their habits, we must not be so uncharitable as to suppose that their life is one of complete apathy, or that these beaux amuse themselves by parading the Broadways of the hive, and flirting with the worker-ladies. Whatever may be their duties, their services are lightly appreciated by the rest of the community; for although they are allowed to remain unmolested in the hive during the summer months, whilst food is plentiful, and a certain number accompany each swarm as it

issues, yet when autumn approaches, and there begins to be a fear of famine in bee-land, the ruthless workers drive the lazy drones out into the cold, and should they attempt to return, they are mercilessly slaughtered. This is an easy task, for the drones are not provided with stings, as the workers are, and they consequently fall an easy prey to their amazonian conquerors.

The most active members of the community are the workers, who construct the combs, and perform all the labors necessary for the preservation of the colony. For this purpose they collect or elaborate the following substances, namely: honey, bee-bread, wax and propolis; and as several of these products are more or less employed by man in art, science, or domestic economy, it will be worth our while to devote a few minutes to their consideration.

**Wax**, the material of which the honey combs are constructed, is elaborated from honey in the body of the bee, and secreted in the wax belts, situated between the rings of the abdomen, from whence the bee draws it forth with the aid of its legs and jaws, when required for the formation of cells.

The appearance of common yellow beeswax in its original state, is of course familiar to all. It has a sweet, agreeable smell, being to some extent mixed with honey, and is then soft and easily moulded by pressure. It is converted into white or virgin wax by bleaching in the sun, combined with a periodical application of moisture, under which influences it becomes white, translucent and brittle.

**Honey** is secreted in the nectaries of flowers, whence it is extracted by the bee with the aid of its delicate tongue. A portion at least of the harvest or gathering is retained by the insect in its crop or paunch, and this is ejected into the cells of the honey comb, on the bee's return to the hive, to serve as a store of food in winter. This substance is so well known that a description of it appears almost superfluous; but we may mention that pure honey is amber-colored, viscid, granulated, and very sweet. It contains two kinds of sugar, the one analogous to that from the grape, the other to that from the sugar cane. It also contains a yellow colored matter, a little wax, gum, and, according to some authors, an aromatic principle and a slight trace of what appears to be acetic acid.

**Bee-bread** is composed of the pollen of flowers moistened with honey. It is collected by the workers on their excursions, and attached to their hinder legs in the form of little pellets with the aid of a remarkable apparatus, called the *basket*, and conveyed home as food for the larvæ as well as the mature bees. If you watch the bees on their return to the hive, you will perceive that the little masses of bee-bread attached to their hind legs vary in color on the different bees, but not on the same insect. This arises in consequence of the several bees collecting pollen from different flowers; but we are told that in no case does the same bee visit more than one kind of a flower at a time.

**Propolis** is the viscid coating with which the ends and twigs of several plants are covered;

and is collected by the bee from these portions of the pine, fir, and poplar, as well as from certain shrubs. It is reddish brown, viscid, easily softened by the warmth of the hand, has an agreeable odor, readily dissolves in alcohol, and when combined with alkali forms a soap. Though it is rarely employed by man (being occasionally used in taking impressions from medallions), yet to the bee it is an indispensable element in the arrangements of the hive. It is used to fill up all the chinks and crevices, but also in cementing the combs to the ceiling, sides, and cross-sticks, and to some extent enters into the composition of the comb itself, being applied as a kind of varnish to give strength and consistency to certain portions of the cells.—*Samuelson*.

### Two Queens in One Hive,

[The following account of a certainly very rare occurrence is communicated to the *Bienenzeitung* by Mr. Hacker, a Bee-keeper at Zele, in Bohemia. It is only an additional proof that in bee culture there is hardly any rule without an exception:]

On opening one of my hives in February, to ascertain whether the bees needed feeding, I found it excessively damp from condensed perspiration. I concluded to transfer the combs to another hive; and, while doing so, saw an old queen which had lost her wings, together with a small quantity of brood. The bees which remained in the emptied hive, I shook out on a linen sheet placed before the other, that they might join their companions. While they were passing in, I and my assistant saw a very active young queen hastily enter. I was aware that two queens had, under similar circumstances been found "dwelling together in amity," but the question still undecided was—were both fertile, and could each still lay worker eggs? In April following I opened the hive. There was a large amount of brood in the combs, and the queens were living in apparent harmony. On the 23d of May I made another examination; and finding both queens present, I divided the colony, making two independent stocks, and giving each a queen. Eight days after I found young brood in each; and now after the lapse of five weeks more, everything is in good condition. Two fertile queens had passed the winter and spring, together, in peace, in one hive.

Where a suitable locality is chosen (well sheltered) I am very much disposed to consider a permanent north or northeast aspect as presenting the most desirable position for wintering bees; but time and the increasing interest in scientific bee management, which is rapidly developing itself, will assuredly disclose to us many truths yet only guessed at.—*Cottage Bee Keeper*.

An apiary should be so situated as to be in full view from the most frequented part of the house, for the instant discovery and remedy of accidents, and the observation of rising swarms.